

A List of Amended Claims:

1. (Currently amended) An isolated nucleic acid encoding a Slo4 polypeptide comprising an alpha subunit of a Slo potassium channel, the polypeptide:
 - (i) forming, with at least one additional alpha subunit, a potassium channel comprising the characteristic of voltage-gating; and
 - (ii) ~~hybridizing under stringent hybridization conditions to a nucleic acid encoding a polypeptide~~ comprising an amino acid sequence having at least 80% sequence identity to of SEQ ID NO:4, ~~wherein the hybridization reaction is incubated at 42°C in a solution comprising 50% formamide, 5x SSC, and 1% SDS, and washed at 65°C in a solution comprising 0.2x SSC and 0.1% SDS.~~
2. (Currently amended) The nucleic acid of claim 1, wherein the polypeptide ~~specifically binds to antibodies generated against~~ comprises an amino acid sequence having at least 90% sequence identity to SEQ ID NO:4.
3. (Original) The nucleic acid of claim 1, wherein the potassium channel further comprises the characteristic of rapid activation.
4. (Currently amended) The nucleic acid of claim 1, wherein the ~~nucleic acid encodes a polypeptide comprising~~ comprises an amino acid sequence of SEQ ID NO:4.
5. (Original) The nucleic acid of claim 1, wherein the nucleic acid comprises a nucleotide sequence of SEQ ID NO:3.
6. (Currently amended) The nucleic acid of claim 1, wherein the polypeptide comprises an amino acid sequence having at least 95% sequence identity to SEQ ID NO:4 ~~nucleic acid is amplified by at least one pair of primers that selectively hybridize under stringent hybridization conditions to the same sequence as the primers selected from the group consisting of:~~

~~5'-GGCGTCTGCTTGATTGGTGTAGGA-3' (SEQ ID NO:23)~~
~~5'-ATCAAAGTTGAGTTTCCTCCCGAG-3' (SEQ ID NO:24)~~
~~5'-CCCGGAGCATCTACCGTACATCTTC-3' (SEQ ID NO:25)~~
~~5'-CCAGCTGTTCAAACGTGTATGGGTAG-3' (SEQ ID NO:26)~~
~~5'-GCTTGGAGGACCATGTTTCAGGAGT-3' (SEQ ID NO:27)~~
~~5'-ATGGTTGATTTGGAGAGCGAAGTG-3' (SEQ ID NO:28)~~
~~5'-CAATTTTGAGAGCATGGGCTGTGAAAG-3' (SEQ ID NO:29)~~
~~5'-GACTTATGGATCAGAACTTATGCCCAG-3' (SEQ ID NO:30)~~
~~5'-CATCTGGTGTAGTTTCATCTTCTGATTGG-3' (SEQ ID NO:31).~~

7. (Currently amended) The nucleic acid of claim 1, wherein the polypeptide ~~encoded by the nucleic acid~~ comprises an alpha subunit of a homomeric potassium channel.

8. (Currently amended) The nucleic acid of claim 1, wherein the polypeptide ~~encoded by the nucleic acid~~ comprises an alpha subunit of a heteromeric potassium channel.

9-21. (Canceled)

22. (Original) An expression vector comprising the nucleic acid of claim 1.

23. (Original) A host cell transfected with the vector of claim 22.

24-69. (Canceled)